what a non-passive failure is.

Q. Okay. And in the rare circumstance that an HID lamp has a non-passive failure, can you tell me what the size of the debris field is?

A. I mean, it would be limited by the geometry of the fixture and the location of the lamp within the fixture and the particles will drop down, mostly down. If your question asks for specific distances and such, I haven't attempted to quantify those.

Q. Yes, that was exactly what I was asking for. Specific size of a debris field that a 750 watt Metal Halide GE explodes or has a non-passive failure.

A. I would say, as a mechanical engineer, I would expect those particles to be below or in the vicinity of an area below the fixture, but I don't know what the diameter of that area would be.

Q. In order to determine the size of the debris field, do you need to know the shape of the fixture itself?

A. To some extent, yes.

Q. And do you need to know how far down the

lamp itself hangs into what I'll call the cone of the fixture?

A. Yes.

Q. And do you need to know how far above something the lamp is located?

A. I mean, I'd say yes. There are a number of other considerations. Like, for example, the manner in which the tube shatters and the direction of motion of the individual particles which we know from photographs that have been taken suggest that the direction is largely radial. So if you think of the radial direction of an arc tube, it is in the direction perpendicular to the main access, and photographs taken by Rhiner and others indicate that the particles go in a radial manner, probably come into contact with the fixture itself, and then drop down more or less vertically, I would expect.

Q. In paragraph number 11, you say that, "There are applications where the risks posed by the small chance of hot particles being emitted can be acceptable." What do you mean by the term "emitted"?

A. Being released from a lamp during a non-passive failure.
Q. So you're talking about the lamp explodes and then hot particles are projectiling outward or projectiling downward or both?
A. Well, I've already described to you what I think would happen, all right? What I mean by "emitted" is particles being released by the lamp in the context of a non-passive failure. Then the geometry of exactly where they go is what we've talked about in the context of the last question you asked. I think I already answered that.
Q. I'm trying to understand the word "emitted." When the arc tube explodes, there's gases within the arc tube; right?
A. Yes.
Q. What happens to those gases?
A. Those are vented during the process of the particles coming apart.
Q. The lamp itself?
A. Well, let's talk about the arc tube, specifically. What happens is that there is an initial failure location within the arc tube that initiates the propagation of a

crack. The propogation of that crack causes the particles to come loose from one another. So essentially, at that stage, the arc tube is losing its structural integrity. In parallel with the crack propagating, the crack pressure pushes the particles outward and -- but at the same time, the gap that is formed between the particles is vented out in a harmless way between the particles as they're moving radially, and that's what I mean by "emitted."

Q. That's the particles are moving radially, as opposed to the gas, what you just said?

A. Your question was regarding the first sentence of paragraph 11.

Q. When you said that -- I just want to clarify -- when you said "radially" was referring to the way the particles were moving, not the gas was moving?

A. I would expect both to be moving radially, but keep in mind that the particles come into contact with the reflector of the fixture. So initially, they move radially, as the recovered lamp indicates, but the

reflector of the fixture actually comes into contact with the particles, but also, the gas, and then essentially rain downward.

Q. The particles?

A. The particles.

Q. Does the gas rain down?

A. It would be directed and deflected also in a, let's say, substantially downward direction because the enclosure of a fixture is typically constrained in an upward direction.

MR. CAMPBELL: It's one o'clock. In order to get anything to eat, given the weather and the like, there's a place downstairs. I know it closes at 1:30. If we need to get lunch, and I'm sure that we do, we should probably break.

(Discussion off the record.)

(Lunch recess.)

Q. (Cont'd. By Mr. Stern) Welcome back. Getting back to paragraph 11, where we left off, the hot particles that are going to be emitted, how fast will they be traveling?

A. I don't know a specific speed.

Q. Have you done any calculations to determine

speed for the hot particles that could be emitted upon the non-passive failure of a 750 watt Metal Halide lamp?

A. No.

Q. And you mentioned that there are examples of such applications, including environments, that do not pose a risk of fire. Is a warehouse one of those examples?

A. Yes.

Q. Okay, and was the lamp at issue an S-rated lamp?

A. That is my understanding, yes.

Q. At paragraph number 12, you state that, "The risks associated with S-rated HID lamps are substantially under the control of the user." Are they also under the control of anyone else?

A. The primary responsibility is with the owner and operator of the facility.

Q. Is that the same as a user?

A. Yes. So typically, in this particular case, Metso would be the owner, operator of their warehouse and they used S-rated HID lamps.

Q. So would the owner of this building be substantially -- it would be substantially

under the control of the owner of this building for the lamps that a tenant puts in?

A. I didn't understand the question.

Q. You said something that I don't read in your report here just now, and you said that owners, operators and users would be substantially under control, but this only says "user." So you've thrown in owners and operators, and what I'm trying to determine, if in fact what you really meant to say was "user," as you state in your report, or this word "user" is something more than a user.

A. It is "user." I stated in the report -- under certain circumstances, the user is also the owner.

Q. And back to the question I asked. Is there anyone else whose control the risk associated with S HID lamps can be under?

A. As we know in this case, we had Andrew Kuzmick, who specified the lighting that Metso chose and also specified the fixtures that were used, and so to a lesser extent, some influence existed through Andrew

Kuzmick, through Friedman, through, let's say, Hubbell, but the primary and substantial control is with the user.

Q. Okay, I'm with you, and I think you've now said that probably three times, but that's not what I care about right now. That's not the question I am asking. You chose the word "substantially," and "substantially" isn't the word "totally," which means there's others which this control is also under.

A. Yes.

Q. Now, you've also told us about a seller; right? Andy Kuzmick?

A. Yes.

Q. Anyone else? We've got the user, we've got the seller. Anyone else or is that now the total universe?

A. There are people that will make recommendations in the process, as we know here, and the decision is ultimately made by Metso, and so the entities that I've mentioned are those who participate in the process about which Metso makes a decision, and so all others that would participate in

that process in some manner would probably be included. I haven't attempted to create such a list, but Metso makes the decision.

Q. We're going to be here a long time. I can see it already. So let's go back to the question and the point that we're trying to discuss here, which is in your paragraph 12, and your paragraph 12 here does not mention Metso anywhere; does it?

A. It talks about the user. The word "user" -- sorry.

Q. My question, is Metso mentioned in this paragraph 12?

A. So the paragraph 12 does not mention the word "Metso."

Q. And was paragraph number 12 written to talk in a general sense, each of those two sentences, or are they specific for Metso and Metso only?

A. This sentence is a general sentence.

Q. Okay. So now, back to what I asked before. You used the word "substantially under the control of the user." "Substantially" is not "totally." So I want to know the total universe of everyone who falls within this

sentence or should fall within this sentence. So you've got the user. You've also told us about the seller. Anyone else?

A. I've also already mentioned the lamp manufacturer.

Q. I'm sorry. I never heard that.

A. I did mention it. Hubbell. That's what I mentioned earlier. Let's stick to general, because the context of paragraph 12 is general.

Q. I thought Hubbell was a fixture manufacturer.

MR. CAMPBELL: He needs to be able to finish his answers. Were you done with whatever you were saying?

THE WITNESS: Yes, for now.

Q. Wasn't Hubbell the fixture manufacturer?

A. Yes. So I had mentioned Hubbell as the fixture manufacturer earlier, and so more generally speaking, in answer to your question, there are many entities that play a very minor role in the decision-making. The user has the deciding role --

Q. Substantial?
A. Substantial or deciding. That's what I mean by "substantial." The other factors that come into play would have to be --
Q. I don't think that answers my question, though; does it?
A. I haven't finished.
MR. CAMPBELL: Let him finish and then --
Q. All I asked are the players, not the factors. That's my question.
MR. STERN: I'm not going to have him answering something that wasn't asked.
MR. CAMPBELL: Then you're going to have to come over and put your hand over his mouth.
MR. STERN: Of course, I wouldn't do that. Please.
MR. CAMPBELL: Finish your answer and then put another question.
A. So you want factors?
Q. No, I don't want factors.
A. You want players?
Q. Players. That's it. That's all that that sentence talks about. It doesn't talk about

factors. It talks about players.

A. Right. Now, I mean factors and players interchangeably. So in this particular question, those players are factors. Okay? So other -- I lost my train of thought here. You want factors?

Q. No. Players. Your sentence talks about players. It talks about the user being "substantially." That means there's other players. If it was just the user, it would be only the user; right?

A. Question number 12 says nothing about players and that's why I wasn't sure what you wanted. So you want players and the players are the people that provide a proposal and the players that are the subject of the proposal, so which would be in this particular case the fixtures that are proposed, the ballasts that are part of the package, the lamps and any other consideration that might come into play in the process of the user reviewing and then ultimately accepting a proposal that is put together by the proposer.

Q. That's what you meant by that first

sentence?

A. No, no.

MR. CAMPBELL: No, no. That's not what you asked him. You asked him to expound on that.

MR. STERN: No. I asked him --

Q. You used the word "substantially under the control of the user." "Substantially" is not "totally." That means there has to be others. Who are the others?

MR. CAMPBELL: He just told you that.

MR. STERN: Well, he said the lamp and the packaging.

MR. CAMPBELL: He just told you -- he went through a complete list. You're not listening.

MR. STERN: I think I am. I haven't heard a list.

MR. CAMPBELL: Yes, you did.

MR. STERN: I've heard factors and factors that a user considers. That has nothing to do with the question or the first sentence.

MR. CAMPBELL: Actually, what you

heard was a list of, to use your term, players, and you can read it back and understand it. That's what he said. That's what he told you. He didn't get into the things you just said.

Q. Is the lamp manufacturer -- are the risks associated with the S-rated HID lamps under the control of the lamp manufacturer?

A. No.

Q. Are there any risks associated with GE's MVR 750 that is at issue in this litigation that are under the control of GE?

A. GE manufactures the lamp. The lamp is placed into a fixture that is then purchased by a user who has a control over those decisions, and if used in accordance with GE's recommendations, which is the influence that GE has in addition to manufacturing the lamp, then the product is safe.

Q. Are there any risks associated with the MVR 750 that are under the control of GE?

A. GE has the control of the manufacturing, has control over the product that it makes, and has the control over GE's own understanding of the environment in which it must be

used. So GE has an obligation to, on the one hand, make in this case an S-rated lamp. It also has the obligation to communicate to the users, directly or indirectly, the conditions under which the product must be used. Those are the obligations that GE has.

Q. Okay. The next paragraph, number 13, it says, "GE recommends that the lamps not be located over combustible materials and that the lamps be group-replaced prior to the end of their rated life, instead of running each bulb to failure." What did you mean by "over combustible materials"?

A. Over materials that can be ignited by hot particles.

Q. Can you show me in any of these documents, any of the exhibits, where GE recommends that the lamps not be located over combustible materials?

A. So this is the materials that were provided by Andrew Kuzmick in the initial proposal. So there's a two-page document, in addition to the cost analysis, Litcost analysis, that was provided by Andrew Kuzmick, and this

document communicates the fact that the hot quartz can reach temperatures up to 1100 degrees C, which I've already stated is an elevated temperature. So to me, that at least communicates to the user, on the one hand, that the temperature can reach very high temperature and also the fact that this elevated temperature arc tube may unexpectedly rupture due to internal causes or external factors.

Q. Okay. Thank you. Switching gears for just a little bit, to go back, before we were talking about rated life. The rated life is calculated by taking a certain population of a number of lamps, presumeably running them for a certain amount of time, and when 50 percent of those lamps are no longer running or burning, that's the point in time that the manufacturer quantifies as the rated life?

A. That's correct.

Q. And for our 750 watt Metal Halide lamp, the rated life was 16,000 hours?

A. That's correct.

Q. So at 16,000 hours, half of the population

of tested lamps stopped working?
A. Correct.
Q. Okay, and if I understand -- correct me if I'm wrong -- but if I understand correctly, GE had that test operating lamps on ten-hour cycles?
A. That's correct.
Q. Okay. So they took the population of lamps, ran them for ten hours. How long did they have them off before they started running the cycle again?
A. I'm not sure.
Q. So they took a set of lamps, ran them for ten hours, off for we don't know how long, then ran them for another ten-hour cycle, continuous, and at 16,000 hours, 50 percent of those lamps had failed?
A. Yeah. No longer operated and the other half operated.
Q. No longer operated. Okay. For the other half that were still operating, how long until the last lamp stopped operating?
A. I don't know the answer to that question.
Q. Did you see any documentation from GE that showed the full experiment or the full

testing of all the 750 watt lamps for rated life and full life span?

A. I have not seen that because I wouldn't expect it to necessarily exist because at 50 percent, you've actually arrived at the answer -- the answer to the question that is being asked.

Q. Is there any reason to continue the test to see when the last of the lamps burns out or stops operating?

A. So typically, in this kind of testing, which is particularly unusual at GE, in the sense that they actually test all of the lamps that are ultimately sold, which-- there is a context in which GE is operating with respect to that testing. Now, relating to the rated life testing, I wouldn't expect them to necessarily perform the test even to the 50 percent mark, which would be in this particular case the 16,000 hour mark. I don't know for a fact whether they went up to that point or not, but there are statistical means of arriving at that determination without doing the test for the full 16,000 hours.

Q. Have you seen any documentation from GE that indicates whether they ran their -- operated the lamps for the rated life for the full 16,000 hours or some time period shorter than 16,000 hours and then you use some formula to calculate up to 16,000 hours?

A. My understanding is that they used a formula that is broadly accepted in the industry to arrive at that determination, but I don't remember specifically what documents are used to come to that determination.

Q. Would the documents be on exhibits 7, 8, or 9?

A. They'd be in the body of the materials that I reviewed in this case, yes.

Q. Which are here?

A. Yes.

Q. Okay. It's not that they're someplace else?

A. No.

Q. Okay. You mentioned in paragraph 14, last sentence, "The operating life of lamps can vary significantly from its published value depending on its usage and the environment it is used in." What did you mean by that?

A. This is the last sentence of paragraph 14?
Q. Yes?
A. Yes. There can be factors such as voltage spikes. There can be environmental factors related to excessive dirt, for example, or mechanical vibration. In heavy industrial applications, mechanical vibration may exist. It may have an impact on the operating life of lamps. Certain components of the fixture, such as the ballast, may also cause the lamp not to perform in an expected manner. Those are some of the factors that I had in mind when I stated this.
Q. And if you jump down two paragraphs to paragraph 16, that also talks about something that can affect rated life. Did you also mean to include that when you used to word "useage" in that last sentence of paragraph 14?
A. Yes.
Q. Okay. So if I understand the last sentence of paragraph 14 correctly and paragraph 16, the actual rated life that GE publishes for a lamp may actually not be the rated life

for that lamp, but in order to really determine the rated life for a lamp, you need to look at the usage and the environmental factors that that lamp is experiencing out in the real world; is that correct?

A. Not at all, not at all. The rated life is the rated life and I think the definition of a rated life of a lamp I've already described and if you want me to, I'll describe again, but it is pretty unambiguous. It is based on the testing of lamps and a determination of the duration of their operating time in the environment in which they are tested. If the environment differs significantly from the testing environment, the operating experience may be different from rated life. Operating experience is an entirely different matter from the rated life. Rated life is a well-defined entity that is published in catalogs and GE and other manufacturers state how they come up with that.

Q. So that the rated life for the 750 watt, which was 16,000 hours, was calculated under

certain test conditions at GE?

A. Yes.

Q. Okay. Then if we take a lamp, one of those 750 watt lamps, we put it out in the real world environment to determine how long that lamp will actually last is not necessarily reflected in the rated life, but is reflected in its usage in its environmental conditions?

A. So how long an actual lamp --

Q. Right.

A. -- will work?

Q. Yes.

A. How long an actual lamp will work in, let's say, some application, such as Metso, will almost never be represented by the rated life because 50 percent of the population lights longer than 16,000 hours and 50 percent shorter, and so the fraction that actually lights the exact duration, even for the test population alone, is zero percent. Okay? So never do you ever, ever expect any one specific light to hit it on the nail. It ain't going to happen and it doesn't work that way.

Q. Is there any safety factor calculated into the rated life that's published by GE for the 750 watt lamp?

MR. CAMPBELL: Object to the form of the question. Go ahead.

A. I think that the definition of "rated life," I think answers your question. The definition of the rated life is the life, the duration in hours, at which in a test environment 50 percent of the lights continue to operate, 50 percent have ceased to operate. So I'm not sure I understand your question.

Q. Okay. Paragraph 16, you talk about operation cycles -- an operation cycle of five hours that reduces the expected life to approximately 75 percent of the published value. Do you see that?

A. I do.

Q. And correct me if I'm wrong, but you got that from some of the material that GE provided you relative to the Metal Halide lamps?

A. That's correct.

Q. Okay. And what, if any, change is there to

the expected life of a Metal Halide lamp if the lamp is operated on a 100-hour cycle?

THE WITNESS: Could you re-read that question, please.

(The previous question was read back by the court reporter.)

A. So if, in the same environment as the one in which GE tests the lights, the operating cycle is lengthened, that may have the influence of increasing the operating duration of -- that is, the median operation, duration, of a population of lights. By "the median operating life," I mean the duration in hours at which 50 percent of the population ceases to light and 50 percent of the population continues to light.

Q. And that's what you were referring to in this example just on the sort of the flip side on a five-hour cycle, as opposed to what I did, which was a hundred-hour cycle?

A. You asked me about a hundred hours --

Q. Yes.

A. I answered a hundred hours, yes.

Q. So running on a five-hour per start cycle,

50 percent of the lamps will have stopped working at the 75 percent of the published value of those lamps?

A. So according to GE, the duration of operation of the median lamp decreases by 75 percent or is one-quarter of the published rated life of those tested based on a ten-hour operating cycle.

Q. When done on a five-hour cycle?

A. Well, the question I just answered was for five hours and it is the life expectancy of the median lamp becomes 25 percent of the rated life that was determined for ten-hour cycle.

Q. Okay. So tell me what is the percentage change, if any, for the median expected life of a lamp when operated at 106 hours?

A. I don't know.

Q. Is it reduced or the same or greater than the published value?

THE WITNESS: Could you read that first question, the one that preceded that last one?

(The question was read back by the court reporter.)

A. I don't know that. The reason why I don't know that is that GE performs these tests and they publish the results of their tests, and I only know what you know, what you have seen, what we collectively have seen.

Q. And is there a change to the expected life -- is there a change to the expected life, expected life's published value, for these lamps when they're operated on a 120-hour cycle?

A. So GE indicates that if the lamps are operated on a 120-hour cycle, all else being equal -- meaning, in the lab environment -- the median life, which is not an expected life, per se, because it's a median life, which really simply means 50 percent of the population is still working, 50 percent of the population is not working, may under certain circumstances be increased by 50 percent.

Q. Paragraph 17, you state that, "Metso also operated the lamps during the work week on a cycle that was significantly less than 120 hours per start." What cycle did Metso operate the lamps during the work week

on?

A. They didn't have a, let's say, a regular cycle. They had a cycle that involved usage during the week and also usage on the weekends.

Q. Right now, let's work on that sentence which talks about the work week and then we'll get to the weekend in a second.

A. I can't answer your question. I think that the premise of your question assumes a regular cycle. If you don't allow me to represent what actually was going on in Metso, I can't answer your question.

MR. CAMPBELL: I think you're also assuming that the work week is Monday through Friday. I think he might have meant something else by that.

Q. Paragraph 17, you have two sentences. How did you differentiate between the first sentence and the second sentence?

A. So what I've done here in two sentences is I've broken down the attention to, on the one hand, the weekends, first sentence, and the work week, second sentence. Okay? Now, let me just elaborate. When we talk about a

cycle specifically in the context of making determinations associated with how long a lamp may work, you need to take the combined complex cycle, if you will, into consideration, because that differs from the conditions under which GE tests their lights.

Q. Okay. So to ask my question again, looking at the second sentence, you state, "Metso also operated the lamps during the work week on a cycle that was significantly less than 120 hours per start." What was that cycle that you're referring to in that sentence?

A. So the work week cycle was less than 120 hours. I estimated that to be about 112 hours.

Q. One hundred twelve hours. So going back to paragraph number 16, where you talk about GE predicting "that the life of a lamp will be short and significantly if they're operated on a cycle shorter than ten hours," Metso was in fact, according to your calculations, operating during the work week on a 112-hour cycle, does GE have any predictions relative to the life of a lamp when it is operated on

a 112-hour cycle?

A. GE makes no representation for -- first of all, GE doesn't distinguish between weekends and during the week and certainly doesn't make representations on a 112-hour cycle, which is not representative at all of what was going on at Metso.

Q. So if I understand you correctly, what you're trying to say is that the fact that the first sentence exists in paragraph 17 negates the second sentence of your paragraph 17?

A. No. I think the second sentence is very clear.

Q. So will the lamps at Metso have an extended expected life by being operated on a 112-hour cycle?

A. I take that that's a hypothetical question?

Q. Yeah, sure.

A. The Metso lamps were not operated on a 112-hour cycle.

Q. They were during the work week, weren't they?

A. All right. So with that clarification, let me state my understanding of your question.

You're asking me to answer to expected life of a lamp by looking at its Monday-to-Friday usage and ignoring the weekend usage. I think that's what you're asking me to do.

Q. Well, I'm not asking you to do that. What I'm simply asking you is, a lamp that's operated on a 112-hour work week cycle, will the life expectancy of that lamp be the same, less than, or greater than its published value?

A. Okay. That's a different question. I'll answer that. So the hypothetical of a lamp being used on a 112-hour cycle in a test environment like GE's test environment, I don't know what the answer to that is. I think that that's largely the same question that I answered a little bit ago, because GE does not test on a 112-hour cycle.

Q. Did GE test on a 120-hour cycle?

A. That's my understanding, yes. They have some experience on a 120-hour cycle based on which they represent their expectations for that duration of cycle in their catalog.

Q. And a 120-hour cycle we know increases by 50 percent; correct?

A. All else being equal and the lamps being cycled, meaning that the on duration is 120 hours, followed by off. The lamps are turned off and then turned back on for 120 hours and so on, without, say, shorter cycles between the 120-hour on duration.

Q. So now, if the lamps are operated for 120 hours and the rated life is thus increased by an extra 50 percent, so would you agree, for the 750 watt, that brings us to 24,000 hours?

A. In a hypothetical situation where the lamps are operated in a lab environment for 120 hours, on 120-hour cycles, that increases the expected median life by 50 percent in accordance with GE, yes.

Q. And does that bring to us 24,000 hours?

A. Sixteen thousand plus eight thousand, that's 24,000, yes.

Q. And so if I understood what you just said a few seconds ago, though, is if during the cycles, the user operates the lamp for something different than 120 hours, that you don't get the full 50 percent increase in rated life?

A. Not only that, you could actually potentially have a decrease because turning the lights on and off for certain durations would decrease the life of the lamps.

Q. So how do you actually determine the rated life for the lamp in your facility if you've got it on a 120-hour cycle, but then at some point between cycles, operated for five hours?

A. So it's fairly straightforward. What you do is you take the catalog at the time that you're spec'ing out, specifying the lamps and you read what the rated life is and ensure that you understand the constraints under which that rated life is represented. That's all you need to do and then you know what the rated life is, which is 16,000 hours.

Q. And then how would you determine the expected life?

A. You don't have to. All you have to be aware of is what the rated life is. What GE says and in fact Andrew Kuzmick himself says that you should group replace on a 75 percent of rated life schedule. So what you need to

know and what GE provides is what the rated life is, which is 16,000 hours for this particular lamp.

Q. Earlier, you were referring to an exhibit and you said that these two pages came from Andy Kuzmick to Metso.

A. Yes.

Q. It's in the binder marked number 7. We never identified what tab.

A. I apologize. It was tab number 2 and it is two blue-colored pages which are pages from GE catalog, followed by the LITCOST Economic Analysis.

Q. How do you know that those two pages were provided by Andy Kuzmick to Metso Paper?

A. I believe either -- I mean, these are Metso discovery materials, so I think it must have come from Dave Kuzmick or Metso people, as part of the package that included the LITCOST, the economic analysis of the lighting, which was the first proposal that was made by Andrew to Dave at Metso.

Q. Have you seen any testimony that these two pages, the first two pages of your tab number 2, actually were provided with the

remainder of the documents in tab number 2 at the exact same time to Metso?

A. I think that's by inference based on the fact that they came from Metso as part of what I interpret to be the bid package from Andrew Kuzmick to Dave Kuzmick.

Q. Did you see something from Metso that said that this was the bid package, that the documents you have in tab 2, all of these documents make up the bid package?

A. Well, let's be clear on what I mean by "bid package." What I mean by this is a proposal from Andrew Kuzmick to David Kuzmick of Metso, who was the person in charge of receiving this particular proposal, and I don't have any reason not to believe that that's the case.

Q. So the first two pages are Bates stamped Metso 59 and 59-A, and do I understand that you reached the conclusion that 59 and 59-A accompanied 60 through 64 because they were all consecutive numbers in the Bates stamp or you received them that way?

A. There may have been testimony on this and I right now don't remember how I came to that

determination. That's just my understanding in this case.

Q. I'll take you to the back, but do you see at the top of the page, there's an indication that reflects that some of these pages were facsimilied?

A. Yes.

Q. And if you start with the last page and work your way forward, the last page says page 5?

A. Yes.

Q. We can see a page 4 and a page 3.

A. Yes.

Q. Then there's nothing on page 2 that reflects that it's faxed or page 1 that reflects that it's faxed; correct?

A. That's correct.

Q. But these five pages would you say go together?

A. Well, I think that all of these pages go together and you know, I would certainly expect, in light of the fact that working back from the back, we go from page 5, 4, 3, it may be then page 2 and 1 were something like a fax cover sheet for this Footcandles study that Andrew Kuzmick took on, and it

seems to be as you suggested in your question that the LITCOST were faxed along with pages labeled 3, 4, and 5 at the top right, nor was the first two pages. Perhaps for consistency here, it appears that the first two colored pages that are part of a GE document were provided together perhaps with the LITCOST and separately then the Footcandles study was faxed.

Q. You state in paragraph 19 that, "Under the operating conditions represented by Metso, the lamp that failed reached the end of its rated life of 16,000 hours in September of 2005, four months prior to the incident in January, 2006." Do you see that?

A. Yes.

Q. How did you come to the September, 2005 date?

A. I think I used a -- sorry. A weekly use of 112 hours and worked it that way. I mean, one can do the math.

Q. Is there something within exhibits 7, 8, or 9 that shows the math?

A. No. I would have done that on a piece of paper that I have not included in my file

here.

Q. In paragraph 21, you state that, "Metso's weekly operation of the GE's 750 watt lamp was such that the expected median life of their lamps would likely have been lower than the 16,000 hours presented by GE." Do you make that statement because of your position in paragraph 17, the first sentence, that the lamps were being operated for less than ten hours each on the weekends?

A. In part, yes.

Q. Is there anything else?

A. Yes.

Q. What else?

A. That they were not operated on a 120-hour duration during the week.

Q. Isn't the 16,000 hours based upon a ten-hour duration?

THE WITNESS: Just read that question. I think I got confused. Go ahead. Just the last question.

(The previous question was read back by the court reporter.)

A. Yes. The 16,000 hours rated life is based

on a ten-hour cycle, correct.

Q. Paragraph 22, I didn't understand this last part in there. You say, "Metso did not keep track of the burning hours of the incident lamp or any other lamp at their facility and at the time of the incident did not have any program in place to replace the lamps as a group to ensure safe and efficient operation of their light fixtures." Are you saying that the only way to ensure the safe and efficient operation of the lamps was to replace them in groups?

A. No, I'm not saying that at all. I mean, if you --

Q. Go ahead.

A. If you replace your lamps in accordance with the recommendations made by GE one by one, not in groups, that's fine. Doing it in groups makes it efficient; that is, quick in time, and also, less costly. So there are great benefits to doing group replacement. The key part with respect to the safe operation of these lamps is to replace them on a, let's say, on a period that is shorter than 16,000 hours.

Q. Was Metso operating the lamps in an improper fixture?

A. I mean, I think there's some fair question there with respect to the fact that the ballast experienced some vibration during the life of these lamps. So I would say that operating lamps in noisy fixtures is not a good idea, but otherwise, I would not say that there's any problem with the fixture.

Q. And was Metso improperly operating the lamp in its operating position?

A. No. It was vertical. It was within the allowed range for this particular lamp.

Q. You make the statement in paragraph 23 that, "Metso's failure to replace lamps before the end of their rated life was in direct violation of all industry and manufacturers' recommendations that were easily acceptable to Metso Paper and the contractors who specified, sold, and maintained the lighting system." How do you know that that information was easily acceptable -- accessible to Metso Paper's Clarks Summit facility in 2002?

MR. CAMPBELL: It says "Metso Paper." You're adding Clarks Summit?

MR. STERN: Exactly.

A. So I mean, they're part of that same organization and I just want to be clear that twice, you said "acceptable." You corrected yourself once.

Q. Accessible.

A. The wording is "recommendations that were easily accessible to Metso Paper." These recommendations have been in the industry for three decades, also. This product has been broadly used. The recommended practices associated with sophisticated users, such as Metso Paper, have been widely distributed and well-known and that's largely the reason why I would expect Metso Paper to know, as well as their contractors, and that includes the local facility; not to mention the fact that Andrew Kuzmick himself had communicated that information to Dave Kuzmick in connection with the proposal he presented to David.

Q. Is that the two pages that we referred to before in your exhibit 2 tab or somewhere

else?
A. Well, that was the first piece of information provided. That was just in addition to what I said before, the fact that that information is broadly and generally available.
Q. I was trying to understand. You said that Andy Kuzmick had provided the information to David Kuzmick.
A. Yes.
Q. Is the only thing that you're aware of relative to this subject that Andy Kuzmick provided to David Kuzmick the first two pages in your tab number 2, or is there something else you're aware of that Andy Kuzmick provided to David Kuzmick?
A. In relation to only what Andrew provided to David, I'm talking what is behind tab 2 in my ring binder.
Q. If an O-rated lamp explodes --
MR. STERN: Strike that.
Q. If the arc tube of an O-rated lamp explodes, what happens?
A. So if the arc tube loses its structural integrity within an O-rated lamp, which is a

lamp that has a shroud around the arc tube, the shroud will largely contain the particles that have come apart.

Q. Is there an outer glass beyond the shroud or is the shroud around the outer glass of the lamp, an O-rated lamp?

MR. CAMPBELL: I object to the form. I personally don't understand it.

Q. Where is the shroud located in relation to the arc tube and the outer glass of an O-rated lamp?

A. So if you mean the outer glass that you typically see as the outer shroud of a lamp --

Q. Yes.

A. -- the shroud is within that outer glass.

Q. It's outside of the arc tube, but inside of the outer glass?

A. That's correct.

Q. So the shroud is designed to contain within it anything that has a problem within it?

A. I beg your pardon?

Q. I know. It's jury talk. The shroud is designed to contain within it any explosions, NPFs, of the arc tube?

A. The shroud is specifically designed to contain particles of an arc tube from an NPF.

Q. Let's move over to the E-rated lamps. What happens if the arc tube of an E-rated lamp explodes or has an NPF?

A. So if an E-rated lamp has an NPF -- E-rated lamp within an appropriately designed enclosure, the arc tube fragments are retained within the enclosure of the fixture.

Q. Is the bulb itself, an E-rated bulb, any different than an S-rated bulb?

A. Not necessarily. It doesn't have to be different.

Q. They could be the same?

A. They can be the same.

Q. With an E-rated lamp though, that is supposed to be within an enclosed fixture; correct?

A. Well, an S-rated lamp can also be within an enclosed fixture. So yes and yes.

Q. An E-rated lamp is supposed to be within an enclosed fixture; correct?

A. That's correct.

Q. An S-rated lamp, that can be in both an open fixture or an enclosed fixture; correct?
A. Under certain constraints, correct.
Q. The MVR 750 at issue in this litigation, was that operated in a plus or minus 15 degree burning position?
A. To my knowledge, yes.
Q. In paragraph 25, you state that, "The GE 750 watt lamp used at Metso's facility was S-rated. It was designed to be operated in a vertical base up position in an open enclosure." Was Metso using the GE 750 watt lamp in a vertical base up position in an open enclosure?
A. Yes.
Q. The next sentence, "For locations where combustibles are present, GE recommends the usage of enclosed fixtures with S-rated lamps." Is that similar to the -- you pointed out before to us, you were looking at -- and again, we didn't identify the tab -- I believe you were looking at the bottom of tab number 2, the second page, and you were talking about the temperature.
A. Yes.

Q. I think we already covered this earlier. Before you were talking in a general sense and now, in paragraph 25, you're bringing it in to Metso.

A. Yes.

Q. Can you tell me what was directly below the lamp on January 21, 2006, and when I say "the lamp," I'm referring to the lamp that we're here about today.

A. Like I said, I haven't performed the geometry and the calculations to make a determination of exactly where the lamp was situated in relation to the racks, but it was in close proximity with the storage racks.

Q. The two photos that appear, two sets of photos that appear as figures 2 and 3, did you take these photos?

A. I did.

Q. Looking at the top one, am I correct that looking at the picture, the left side of the picture, that lamp is on and the right side, the right lamp is not on?

A. That's correct.

Q. Is there a problem to operate or have a

Metal Halide lamp in an enclosed fixture and not be on?

A. I don't understand the question.

Q. Going back to paragraph 26, "To this day, Metso continues to operate lamp fixtures with open fixtures and bulbs that are not O-rated at their facility in Clarks Summit, PA where this incident occurred. Figure 2 shows a photograph of two such fixtures taken on 8 April 2010. Figure 3 shows a close-up of the lamps in these open fixtures." From reading this report, I take it that you believe that that is a problem to operate an S-rated lamp in the Clarks Summit facility in an open fixture; correct?

A. No. I think there's a couple of points to be made about that. On the one hand, Metso understands, even having experienced the fire with S-rated lamps in open fixtures, that taught them that there is a risk associated with operation of S-rated lamps in open fixtures and it is a risk that they understand, they know what the consequences of that risk is. They also understand what

the benefits of S-rated lamps are, and most specifically, they understand what the cost savings are in running S-rated lamps, and for that reason, it's clear that they performed some form of, let's say, determination, based on which they've decided to continue to operate S-rated lamps in their facilities. So what I learned from this is, they think S-rated lamps are fine, even though they've had a fire, largely, probably, although I have not spoken with them, because there are great benefits associated with these lamps. That's what I think about this, and to the extent that they've made a determination to continue to operate these lamps in an environment that presents a risk of fire, that's a determination that they would have had to make in this context.

Q. Okay. So in your photo, though, only one of the lamps is operational; correct?

A. So only one is lighting. The other one is not lighting. Correct.

Q. Correct. Operational.

A. Well, it could be -- it is on, as opposed to

not working because it is broken. So that was ambiguous and I just wanted to be clear on that.

Q. Okay. Is it a problem to keep that lamp that is not on in that location?

A. Only if it presents an undue risk of fire.

Q. Does a lamp that's not on present an undue risk of fire?

A. Most lights that are not operating, not energized, present little risk as long as they remain unenergized.

Q. Was there power energy going to this lamp or was the switch off?

A. I don't know.

Q. I may have asked this earlier when we went over your bio. You're not a lighting expert; are you?

A. I've certainly worked on lighting-related issues in the past and I've actually testified in court on light and visibility issues, but I'm a mechanical engineer and I come at these lighting issues from a mechanical engineering perspective.

Q. Are you a lighting sales engineer?

A. I am not a lighting sales engineer.

Q. Are you a lighting design engineer?
A. I am not a lighting design engineer.
Q. Are you an accountant?
A. I'm not an accountant, but to the extent that accounting is a responsibility of mechanical engineers, I use those kinds of tools and methods.
Q. You mention in paragraph 28 that, "GE and all other major HID lamp manufacturers make and sell S-rated lamps. These cost less than O-rated lamps." Do you see that?
A. I do.
Q. How much less does it cost to make an O-rated lamp than an S-rated lamp for the exact same wattage to GE?
A. So you're asking me what the difference in manufacturing costs to GE are.
Q. Correct.
A. I don't know that.
Q. In 2002, did GE manufacture an S-rated 400 watt Metal Halide PulseArc?
A. S-rated 400 watt, yes.
Q. And you're looking at tab number 8?
A. I'm looking at tab number 8, which is 2001-2002 GE lighting catalog.

Q. And did they also make an O-rated 400 watt?
A. Yes.
Q. What was the manufacturing cost difference to GE for those two lamps?
A. I don't know. You'd have to ask GE.
Q. What was the sales price of each of those lamps in 2002?
A. Of the 400 watts -- I don't have pricing associated with this catalog here for 400 watt lamps.
Q. Where did you get this document that shows up in tab number 8?
A. So it has a GE Bates number on it. It's through the discovery. I don't know --
Q. You got this from GE?
A. Well, it's part of the case discovery materials. I don't know what else to say.
Q. Did Metso send this to you? Where did you get this from, literally?
A. Literally? I mean, this would have been a document that GE provided to all sides as a discovery response.
Q. Would you be surprised to hear that this entire document that's sitting in front of you was not actually produced in this

litigation?

A. I wouldn't know, one way or the other. I would be surprised. I mean, it appears to me to be part of the discovery materials.

Q. Would you be surprised to learn that there were depositions involving this type of document and this type of document appeared differently than you have in your tab number 8 at those depositions?

MR. CAMPBELL: Object to the form of the question.

A. I don't know.

MR. COOPER: We produced the catalog.

MR. STERN: Do you want to go off the record?

MR. CAMPBELL: I'll stay on the record.

MR. STERN: Even your Bates stamping on these shows that you didn't produce that whole document to us. Some of your pages don't even have a Bates stamping on them and there's nothing you produced -- we made the mistake, but you never made this mistake. There is nothing that you gave us

that didn't have a Bates stamp.

MR. COOPER: We produced the entire HID section of the catalog for 2001, 2002.

MR. STERN: You certainly didn't produce those first pages and we sat in depositions trying to figure out whether that document even applied to this case and your own people said they weren't sure.

Q. All right. Back to where we were. I don't want to waste your time on this. In 2002, was there an O-rated 750 watt lamp?

A. No.

Q. Could GE have made, in 2002, and sold an O-rated 750 watt lamp?

A. I mean, that's a complicated question. From the standpoint of whether it is -- the decision to manufacture a certain product has to do with what is in the marketplace, what the competition is making, and what is the marketplace demand. That is, what demands are there for what products. This is an area that I have not attempted to look at at all, and so in answer to your question, could they, I really don't know. It may have been something that potentially

would be completely impractical, but I don't know, one way or the other.

Q. Your figure number 2, the photo, in figure number 2 --

A. Yeah.

Q. -- what was directly under that lamp that's operational?

A. There were some roller resurfacing activity going on. So essentially, either a coater or paper machine roller, like a large cylinder. The activity that was undertaken in this general area was to re-coat or surface those rollers and that is what was in the vicinity of this fixture.

Q. These two fixtures that we see at figure 2, they are not in the same room where the lamp issue in this case was located; correct?

A. Right next door. Very close by. On the other side of the doorway.

Q. In the much bigger room?

A. That's correct.

Q. Okay. Do you have any knowledge as to who GE's competitors were in 2002 for the manufacture and sale of Metal Halide lamps?

A. I have a general understanding.

Q. Who were they, generally?
A. Philips, Osram Sylvania, and those are the principal competitors.
Q. And in 2002, were there any other manufacturers of Metal Halide lamps being sold in the United States?
A. There may have been. I have not independently checked that. I've seen references to a company called Venture, but I hadn't heard about Venture before and I haven't independently tried to establish --
Q. If you could take a look at paragraph number 34. You start out this sentence by saying, "Industry should not be denied access to this product, the cost savings it provides and its other advantages for the many applications where it can be used with an acceptably low level of risk of fire or injury." Who are you referring to by the word "industry"?
A. I'm talking about industry at large. Every single potential user of an S-rated lamp who has a low level of risk associated with fire or injury should be allowed to purchase S-rated lamps.

Q. In 2002, are you aware of any -- are you aware --

MR. STERN: Strike that.

Q. Are you aware that, by 2002, some manufacturers of Metal Halide lamps had stopped selling S-rated lamps?

A. I'm not aware that any of the major players in this industry had done that.

Q. Any minor players or median players that you're aware of?

A. So my understanding is that GE, Philips, and Osram Sylvania continued to manufacture, market, and sell S-rated lamps. It has been represented that Venture, which I had never heard of until this case, for reasons that I don't know were not manufacturing this particular product.

Q. Where did you gain that information from?

A. Oh, good question. I think that that may have been Rhiner's report. I think that Rhiner may have represented that either in his report or -- yeah, I think that, to the best of my recollection, that's why where I heard that.

Q. Do you have any independent knowledge

regarding a change to the national electric code that impacted Metal Halide lamps?

A. Yes, generally, yeah, I do.

Q. Aside from what you may have gathered in this litigation.

A. I do.

Q. Okay, and what knowledge did you independently have?

A. Well, the Building Code, which incorporates the National Electrical Code, made a determination that going forward, S-rated -- that is, S-rated lamps should no longer be installed into open fixtures. However, S-rated lamps could, according to the National Building Code and the National Electrical Code, could continue to be sold and not only that, also installed into open fixtures in those facilities that had previously used open fixtures for S-rated lamps and that is my understanding of that.

Q. When did that change come about? When was that change?

A. That was in about. I believe, 2005-2006 time frame. I can't remember the exact date.

Q. At some point in time, did good I stop selling the 750 watt lamp as an S-rated and only sold it as an E-rated lamp?
A. So my understanding is that that same lamp has continue to be sold, but it simply was re-labeled as an E-rated lamp, just for marketing reasons.
Q. When did GE begin to only market that lamp as an E-rated lamp?
A. I believe it was after, I want to say, 2006-2007 time frame. Something like that.
Q. And why did GE decide to now only market that lamp as an E-rated lamp?
A. Based on their own description, it was to harmonize their own catalog and standardize their own catalog to the competition's catalogs. That is my understanding.
Q. Had the competition already begun marketing their 750 watts as E-rated only and no longer marketing them as S-rated?
A. So that would be my interpretation of that, but what I haven't done is gone to look at Philips' catalogs and Osram Sylvania's catalogs to see what happened when. I don't know that independently.

Q. In paragraph 35, you state, "In this case, Metso overlooked the recommendations provided by GE and used S-rated lamps in the presence of combustible materials and chose to operate the lamps beyond their rated life, instead of group-relamping at or before the end of their rated life." Do you see that?

A. Yes.

Q. Are you saying that Metso made a conscious decision to operate the lamps beyond their rated life, instead of group-relamping?

A. I can't speak to the rationale behind what was done. I'm just speaking to what had happened. So they overlooked the recommendations. The recommendations were not followed in the sense that S-rated lamps were used in the presence of combustible materials -- that's one point -- and the lamps were operated beyond their rated life of 16,000 hours --

Q. I think we are on the same page.

A. Yeah.

Q. You chose the word "overlooked" -- I shouldn't say "chose." You used the

word "overlooked" and you used the word "chose." I'm just trying to understand, were you, by using those words, communicating they made an affirmative decision to follow that course of action, as opposed to what it sounds like you're saying is something else, they did not make an affirmative decision to do that?

A. What I do know is materials were provided to David Kuzmick. As to whether David then utilized those documents and information that was provided to him, I know that these things did not happen and the reason why they didn't happen, I don't know. I don't know what was in his head or in the minds of other people at Metso.

Q. Did you see anything that indicated to you that Metso had made an affirmative decision to follow this course of action?

A. Well, yes. I know -- you know, obviously, we know now, based on the photographs that I've taken, that Metso considers S-rated lamps in open fixtures perfectly appropriate because they continue to use them. So that since then, there has been -- I mean, I have

to believe that there has been an affirmative decision in light of the event that occurred in the warehouse.

Q. Good clarification.

A. Yeah.

Q. Let me then put a time period on it.

A. Okay.

Q. Of course, I don't believe that this was talking about specifically post-fire. Pre-fire, have you seen any documentation, any testimony, any affidavits, anything in 7, 8, or 9, that indicates to you that, pre-fire, Metso made an affirmative decision to operate the lamps beyond the rated life, instead of group-relamping at or before their rated life?

A. So the only thing I can point to is the fact that -- and we all know how this happened -- you're given some materials that's got some important information in it and you just don't read it. Okay? That did happen. That is, whether David read it or didn't act on it or chose not to read it, I don't know. It seems that the flow of information stopped after Andrew Kuzmick had provided

the materials that we've already spoken about. In addition to that, I don't know of any other information.

Q. Paragraph 36, I'm not sure I get this. "The sections below quantify the cost savings associates with the S-rated lamps and the additional costs that would be incurred in using O-rated lamps or enclosed fixtures. Such costs should not be imposed on to end users in applications where S-rated lamps and open fixtures present an acceptably low level risk of fire or injury." When I read that and I see that GE is only selling the lamp as an E-rated lamp. Do you take issue with GE selling this lamp as an E-rated lamp only?

A. I guess we have to be careful about the timing of your question. Just the last question, you yourself were concerned about pre-fire and post-fire. So I think, generally speaking, the idea of selling lamps that can continue to be manufactured as S-rated lamps and put into open fixtures -- and this is what paragraph 36 speaks to -- is perfectly okay in those

applications that present a acceptably low level risk of fire or injury. That's all I'm saying. So this paragraph, as you can see, is a general paragraph on S-rated lamps.

Q. But GE doesn't sell any more of the 750 as an S-rated lamp. It only sells it as an E-rated lamp; right?

A. A couple of things. First of all, this paragraph is a general paragraph that speaks to S-rated lamps, in general. Okay? It doesn't say 750 watt or the specific model of this particular lamp; and secondly, in accordance with the 2006 lamp products that may have been since updated, but I don't have the updated version -- if you look under PulseArc, there are S-rated 400 watt lamps, 350 watt lamps. In this particular catalog, there still is a 750 watt S-rated lamp. So I think that answers your question.

Q. I'm not sure I understand your paragraph number 37. Are you saying that, by putting a lamp inside of an enclosed fixture, that just by doing that, that shortens the lamp's

life?

A. So if you look on this page where the paragraph number appears, last sentence, and I'll read it, "These factors tend to reduce the amount of light from the fixture and tend to shorten bulb life." So there are really two points here. One is that additional obstacles, whether they are the obstacles in an O-rated lamp or the lens of an enclosed fixture, those will reduce the amount of light. That's point number 1; and the second point is, to the extent that the lamp is enclosed in a fixture that does not afford the cooling that you typically would have in an open fixture, that will elevate the temperature and can reduce the useful life of a lamp.

Q. If Metso had installed its 750 watt lamp in an enclosed fixture, would that lamp's life have been shortened merely by the fact that it was in an enclosed fixture?

A. So I think the answer to your question is whether the rated life of a lamp would change if you perform the test that GE performs, let's say, with the ten-hour

cycling and so forth that we've already discussed, but now, in situations where the lamp is in an enclosure, as opposed to not in an enclosure, and the answer to that question is that I expect that some effect will exist, and the question is whether the effect is or is not significant in relation to the spread in the life of the lamps that are tested. Let me put that in other words. When you perform a test, as we've already described that GE does, the duration that each lamp continues to light will vary and it will vary in accordance with a normal distribution. The normal distribution has a certain characteristic width to it. The question here is, if you now operate a lamp in an enclosure, is the change in the median life, which we've already defined by a duration significant compared to the width of that normal population. Technically, that's what you would look at to see whether it's significant. The only point I'm making is that I expect there to be an effect. Whether it's significant or not, I don't know.

Q. But that effect will shorten a bulb's life?
A. It will shorten the median life. What I mean by that is it will shorten the median life of that population because remember, no one lamp will ever light for the duration of the rated life.
Q. Have you seen any tests to determine how much shorter the median life of a lamp would be if it was run on a ten-hour cycle in an enclosed fixture?
A. I have not.
Q. Okay. Have you done any tests to that effect?
A. I have not.
Q. Have you seen any of the documentation that GE creates that's in exhibit 7, 8 or 9, anywhere where it says that operating a lamp in an enclosed fixture will shorten the median life of that lamp?
A. I don't recall seeing that, but I mean, I think it's simple physics. You know, there's no question that the exterior operating temperature that the lamp will see will be different because it's more insulated in an enclosed fixture than it is

in an open fixture, and as a result, the operating temperatures and such will be slightly different and will have the effect that I state in paragraph 37.

Q. If I could take you to paragraph 41, you talk about added maintenance costs. Do you see that paragraph 41?

A. I do.

Q. How much are those costs?

A. So those costs -- this is 41; right?

Q. Yes.

A. Those costs will be associated with the accumulation of particulate material and bugs, just insects, and it depends a little bit on the environment. You may have at any one facility a cycle of cleaning fixtures yearly for enclosed fixtures and that cycle may be more frequent -- the cleaning may have to be more frequent because bugs accumulate more and there are certain places where you just have more bugs than other places, and so you may have to do it quarterly, instead of yearly, and that will add to the cost; and with respect to what the specific increase in cost would be, that

is something that is quantifiable and that I talk about in my own cost analysis.

Q. And these costs here that you're talking about in paragraph 41, you can't quantify these exact costs -- you can't put a value or quantity on these; correct?

A. Well, you can.

Q. Doesn't it vary by location?

A. Yes. I mean, for any one scenario, you can estimate what the cost would be. That is, you can estimate the duration of time it takes. You can estimate, let's say, the equipment rental costs that you may need to incur; for example, for a lift of some kind to reach to the lamps, and you have an idea of how many lamps you have, and so from that, you can actually get your arms around what the true cost is associated with performing that kind of work, and that's something that is done routinely in these kinds of applications.

Q. And does this include labor rates?

A. Yes. I mean, you know what your staff costs you. You can certainly estimate how long it would take them to do the job, particularly

if it's been done before, and that allows you to quantify these things.

(Discussion off the record.)

(Recess.)

Q. Looking at your paragraph 44, it appears you're talking about an O-rated 1,000 watt lamp in 2002; correct?

A. That's correct.

Q. Can you show me in the catalog that you have that we looked at before an O-rated 1,000 watt lamp in 2002?

A. So here is one such -- 1,000 watts protected multi-vapor Metal Halide lamps, and these are all O-rated, a thousand watts.

Q. And this page indicates all of the protected Multi-vapor Metal Halide lamps at various wattages from --

A. Let me just take a look. Yeah, that appears to be -- for example, there's a 400 watt PulseArc Multi-vapor Halide lamp designated ED39 39 with an O-rating and the same product appears here.

Q. On this page, which has a Bates number at the top of --

A. 001304. So the line below the 400 watt

entry has a BT56, a thousand watt O-rated.
Q. When was the 750 watt first sold?
A. I don't know for sure.
Q. Do you have a general understanding of the time period when it was first sold?
A. Not really. I have not really tried to look at that.
Q. Would it surprise you to learn that the first time the 750 watt was sold was referenced in this 2001-2002 booklet?
A. It's not something that I've needed to look into or consider.
Q. Would it surprise you to learn that, in 1999, the 750 watt was not sold?
A. That would be consistent with my general understanding that the 400 watt lamp, for example, is sold more than the 750 watt lamp, but I have not really taken the history of the development of the 750 watt lamp into consideration.
Q. Do you know why there are O-rated lamps for the 320, the 350, the 400 -- sorry. I'm looking at the wrong page. Here we go. Why there are O-rated lamps for the 32 watt, the 50 watt, the 70 watt, the 100 watt, the 150,

the 320, the 350, the 360, the 400 and the 1,000, but not for the 750 watt, as reflected in this catalog in your tab number 8?

A. I don't know. If I needed to know, I would probably look into marketing considerations, but I don't know and I haven't attempted to figure that out.

Q. How did the cost of the 750 watt lamp change from when its marketing changed from an S-rated to an E-rated lamp?

A. There's two aspects to your question. One is the cost of manufacturing and then the other is what it is priced at for purposes of sales and I don't know either. I would expect the cost of manufacturing would not have changed because it was simply a relabeling.

Q. Can you tell me about any courses that you've taken on the balancing of the costs and risks of end users for lightbulbs?

A. So you're asking me about a course, one course on the cost and risk associated with lightbulbs to end users. I don't think there is any course that I have heard of,

but I certainly haven't taken it.
Q. Okay. Paragraph 45, you put the words in the second sentence "safe" and "risk free" in quotes. Why did you use quotes for those phrases?
A. For emphasis. Nothing else.
Q. The next sentence, you said, "The definition of 'safe' is 'acceptable risk.'" Where did you get that definition from?
A. I mean, that really is -- as a practicing engineer, that's something that you, I think, have to, A, understand and deal with on a routine basis. I mean, that's broadly known, generally accepted, and often written about.
Q. In where; in the engineering field?
A. Engineering field, absolutely.
Q. The next sentence says, "Risk is measured in terms of frequency and severity." What do you mean by that?
A. So risk really has two components. One is, what is the likelihood of a scenario. The other component of it is what are the consequences of the scenario. For example, how frequent is the scenario. Is it going

to happen daily, weekly, monthly, yearly or less frequently, and what are the consequences. The consequences could be something very small, like minor damage that can be just cleaned up, if you will, with a mop, all the way to significant loss of property. So that's what we mean by "risk."

Q. In paragraph 49, you state that, "The yearly rate of HID lamp induced fires is so low that it is subject to considerable statistical uncertainty." Where did you get that information from?

A. Which information? Where do I get this sentence from or --

Q. Well, you say in that sentence, "The yearly rate of HID lamp induced fires is so low that it is subject to considerable statistical uncertainty." If you'd like, we could break it down. You first state that it is so low. Where do you get that information?

A. Well, one example would be the NFIRS database. There are a number of other sources, but the fact of the matter is the

yearly occurrence of these events could be counted on your hand or a couple of hands, and as a result of that, the reliability of that data set of those occurrences is subject to significant fluctuation because if it fluctuates by one incident, then the percentage changes very large because the occurrence rate is so small.

Q. You said on one or two hands it could be measured, and is that why you use the words "so low" in this sentence?

A. Well, what I mean by "so low" is, if you look at the NFIRS data, you're talking on a yearly basis at one, two occurrences. Something like that. So to me, that is low. In light of the very large population of HID metal Halide lamps out there.

Q. And you were referring to the documentation within tab number 19 of your book?

A. That's correct.

Q. What is in this tab?

A. This is NFIRS Warehouse Fire Statistics.

Q. Are there any other statistics for fires?

MR. CAMPBELL: Anywhere?

Q. Anywhere.

MR. CAMPBELL: Any kind of fire?

Q. Any kind.

MR. CAMPBELL: I bet there are.

A. I mean, I think that there are publications that specialize in the presentation of fire statistics, so there's no question that there are other publications that might be put out by the NFPA or the SFPE or other organizations.

Q. Did you look at any of those statistics?

A. Yes.

Q. Are they contained within this material here in exhibits 7, 8, or 9?

A. Yes.

Q. Where are they in exhibits 7, 8, or 9?

A. There are some statistics behind tab 10 of exhibit 7.

Q. And the first page says "IRI Information"?

A. Yes.

Q. So it's in this section?

A. That's correct. Is there anything else -- so we have tab 10 and tab 19. Any other information or is that it?

A. There's plenty of information.

Q. And did you look at that information?

A. I looked at everything that I could get my hands on that was relevant.
Q. And is all of that here in exhibit 7, 8, or 9?
A. Yes.
Q. And it's only tabs 10 and 19 that contain the relevant information?
A. No. I think my entire file contains the relevant information that I brought here today.
Q. As to statistics and number of fires?
A. That's not what you're asking me, but I will answer that question.
Q. I thought that's what we were talking about here.

MR. CAMPBELL: The question was information.

Q. If every sentence I need to start over from the front, I will.
A. Tab 11 has statistical information. Tab 13 has statistical information. There's also statistical information on exhibit 10.
Q. And this goes to "the yearly rate of HID lamp fires is so low"?
A. No. This is just statistical information of

properties of lamps.

Q. Obviously, you and I are not speaking the same language. Let me try again. I want to know and I'm focusing on this sentence, "The yearly rate of HID lamp induced fires is so low." You wrote that; right?

A. Yes.

Q. You reached the conclusion that it was so low; right?

A. Yes.

Q. Did your attorneys reach that conclusion?

MR. CAMPBELL: Object to the form of the question. You can answer.

Q. Tell your attorneys tell you to write "so low"?

MR. CAMPBELL: Object to the form of the question.

A. No.

Q. So this is your decision to call the yearly rate of HID lamp induced fires "so low"?

A. Yes.

Q. I want to know where you got the backup to reach the conclusion that the yearly rate of HID lamp induced fires is so low, and originally, you pointed us to tab number 19;

right? Then you took us to tab number 10.
A. Correct.
Q. And then you started talking about exhibit 10, but we clarified that that's not what we're talking about.
A. Well, tab 19, tab 10 -- not to be confused with exhibit 10 --
Q. Correct.
A. -- and then I also talked about tab 11.
Q. Is that it?
A. I think that there may be some related information behind tab 13, but really, the foundation for paragraph 49 in my report is behind these tabs that I have just identified for you.
Q. Earlier, you mentioned that NFPA may have some statistics.
A. Well, you broadly asked me a question about whether there is information. My interpretation of your question was generally information about fires. So there's a wealth of information out there that I think addresses a scope that is much broader than what you're asking me about paragraph 49.

Q. So now, my next question is going to be: Did you look through any of the NFPA's data to determine if they can identify or have identified the yearly rate of HID lamp induced fires?

A. Yes.

Q. What did you look at?

A. So this is specifically an NFPA document dated April-May, 2001 on the loss history associated with HID lighting.

Q. That's within tab number 10?

A. That's correct.

Q. Anything else from NFPA that you looked at?

A. Well, specifically, NFPA, I think that was probably the most, let's say, on point material that I was able to find from NFPA that specifically addresses this question. I just want to clarify here that I performed my own statistical analysis using NFIRS, which is a national database associated with fires. NFIRS is not directly associated with NFPA. It's really an electronic database that essentially continues to be maintained by the Fire Service nationally.

Q. I believe you talked about that later on in

your report. So tell me about the severity of the HID lamp induced fires for -- that you identified to justify the yearly rate being quantified as "so low"?

A. I don't think I can answer that question. That's an ambiguous question to me.

Q. Why?

A. I separate "severity" from "frequency." Those are two independent entities and you're asking me to answer both in the same question.

Q. For each of the fires that you identified that occurred that you quantified, you counted, and the number was a number that allowed you to state that the yearly rate of HID lamp induced fires is so low, did you also look at the severity of each of those fires?

A. You're asking me what the extent of damage might have been?

Q. Yes.

A. I have not done that.

Q. Paragraph 51, you talk about different types of statistics in this paragraph, as well; correct?

A. Yes.
Q. Is the information in this paragraph from the materials in tab 10?
A. Yes.
Q. And it says that, "In 2000, a total of about 35 million HID lights were sold in the US of which Metal Halide lamps numbered 19.5 million." How many of those lamps were S-rated?
A. I don't know.
Q. How many of those lamps were O-rated?
A. That's probably a question that would be best posed to GE personnel that might be able to break it down, based on marketing information and sales information.
Q. I'm asking if you know that information.
A. I don't know.
Q. Okay, and how many of those lamps were operated in open fixtures, any of the 19.5 million?
A. I don't know the breakdown. I would expect -- I just don't know.
Q. You state in paragraph 52, "In the three decades that HID lamps have seen widespread use, lamp NPFs that have been claimed to

have resulted in a fire have numbered in the few dozen." Is it possible that HID lamps caused fires that weren't claimed?

MR. CAMPBELL: I object to the form of the question.

A. I would say, practically speaking, it would be very unlikely, and the reason why I say that is my experience, if there is a fire, there typically will be a claim.

Q. Have you ever been involved in any fires where the cause was undetermined?

A. That has occurred, yes.

Q. Does it frequently occur?

A. That is a question that has to do with really multiple issues. One is that the fire service has an obligation to make a determination as to whether a fire was intentional or not. Okay? Often times, if the fire clearly was not intentional, the fire service as a matter of routine will call it undetermined if they don't really have any better information, other than knowing that it wasn't intentional. That does not mean that there will not be a claim following that, in the sense that there may

be an insurance claim where an insurance company may be involved that, you know, has had to pay for certain damages, the life of which, you know, will vary according to claim by claim.

Q. So if a fire is classified as undetermined by the fire department and there is no specific insurance claim, will the NFPA record that type of incident in its statistics?

A. So it happens routinely that there is an undetermined fire which is associated with some piece of equipment or a probable cause, in the sense that -- and I've seen this so many times -- where the fire department rules it as undetermined largely because it was not intentional. They are not a hundred percent sure exactly what caused it. They think they have reasonable, let's say, information to believe what the cause was, and it is then registered under that cause for the fire. So "undetermined" itself does not mean that the fire department has ruled that they don't know what the cause was.

Q. Are you saying that NFPA keeps records and

statistics on fires that have an undetermined cause?

A. Well, first of all, the records -- NFPA publishes articles on the cause of fires, and often times, they will rely on the NFIRS database. So the NFIRS database has a field associated with probable cause and the probable cause in the case of a fire that is started by, let's say, an HID lamp will be entered as such and there's a field that is absolutely appropriate for that, to capture those kind of events. Now, as to this issue of undetermined, sometimes the fire department will say the fire is undetermined. "We think it was this, but we're not completely sure," and they'll identify the cause that way.

Q. In the NFIRS database?

A. Yes, or in fact the fire report which then feeds into the NFIRS database.

Q. Have you ever been involved in a fire where the cause was undetermined, period?

A. Yes.

Q. And how would that -- how would the ultimate cause of that undetermined fire be recorded

in the NFIRS database?

A. So in some instances, the cause will be correctly identified, can be correctly identified and in some instances, like one specific fire that I worked on, nobody ever found out what the cause was and it was just undetermined and there was no identified probable cause.

Q. So in those type of circumstances, there would be no recording of what did cause that fire because it was just undetermined?

A. That's correct.

Q. In the last sentence of paragraph 52, you say, "The fraction of these claims that were objectively determined to have actually resulted from an NPF is unknown, but very small." Can you explain that to me?

A. Yes. If there is a fire that is identified in, let's say, the NFIRS database as being associated with HID lamps, specifically, Metal Halide lamps, first of all, the class of lamps that fall under the category is broader than just the specific lamp in question here, and so what that means is that -- just be specific to this -- so the

class that is the most relevant is Sodium Mercury Vapor Lighting fixtures or lamps. That includes ballasts, fixtures, fixture problems, lamps, and can certainly include, let's say, electrical problems that are ultimately manifested through the fixture or the ballast. Something like that. Okay. So in the process of entering the data into the NFIRS database, this class, that is really the only class that is relevant to these particular kinds of lamps, is broader than HID Metal Halide lamps because it includes ballast and fixtures. Also includes Sodium High Pressure lamps, Mercury Vapor lamps, and so forth. So as you look at the statistics, you have to take into consideration that some fraction of the data that has been entered into the database is not going to be relevant to HID Metal Halide lamps. That's really all I'm saying, and in addition to that, the mere entry of a certain product into the database does not necessarily mean that actually, it was the cause. Often times, something else may be determined to be the cause. So that's

really what I mean in this particular paragraph.

Q. How come in paragraph 53 -- well, in paragraph 53, you say "examination of millions of records of fire data." Did you personally examine millions of records?

A. I had our data analyst do that. That is, I've routinely used NFIRS for these kinds of queries, but I'm not the one querying the database.

Q. How was it selected to just look at the 1999 and 2006 time period?

A. I made that determination. What exactly do you mean? Are you asking --

Q. Does the database only exist from 1999 through 2006?

A. No. It exists for obviously a much longer period of time. For that period of time, the database actually has a specific field that I identified for you. This is under NFIRS now. So this is "Sodium, Mercury Vapor Lighting, Fixtures or Lamps." That particular field, if my memory serves me right, only was brought into the database in 1999 and did not exist prior to 1999, even

though these lamps have been used for a couple of decades by that time.

Q. Who printed out these documents that are within your tab number 19?

A. Who pushed the print button?

Q. Yes.

A. Either an administrative assistant or Vijay Somandepalli.

Q. Did you look at any of the screens on the computer or were you looking at the printout?

A. No, no. I reviewed this data as we were gathering the data and I was actually communicating with the individual who was performing the data harvesting. So I was involved in directing this process.

Q. I see at the top it says "NFIRS Warehouse Fires." Why is this limited to just warehouse fires and not other types of fires?

A. Because I felt that this was the most representative type of facility to be looking at in the context of this case.

Q. And when you looked at this NFIRS data, you saw only eight fires related to HID lamps;

correct?
A. No. I saw eight entries under the rubric -- and there are two groups -- "Halogen lighting fixture or lamp" grouped with "Sodium, mercury vapor lighting fixture or lamps." Under those two groups for a period of 1999 to 2006, the total was eight.
Q. I've got you. So did you look to see the details of those eight fires?
A. That, I have not done. I haven't investigated that.
Q. Do you know if death occurred in any of those eight fires?
A. I know nothing about those specific entries.
Q. What information do you have regarding the number of HID lamp explosions, NPFs, at facilities, other than warehouse?
A. I actually haven't run that query.
Q. In paragraph 56, you talk about heating and ventilation equipment. In those 415 fires, how many involved exploding equipment?
A. I don't know whether, on the one hand, that's something that is searchable. That is, I'm not sure that that's something that can be easily determined. On the other

hand, through case-by-case queries, ultimately, getting the fire department report, to determine whether a propane tank blew up or something like this, it's something that can happen, but I don't know in the context of the query that I carried out because I did not attempt to acquire the fire department reports. It wasn't the purpose of my query.

Q. Is it possible that of all 415, there was no exploding heating and ventilation equipment?

A. I have no idea.

Q. You don't know because you just didn't look for that information?

A. I didn't look for it. I know that -- there's a broad range of scenarios. This particular query captured -- a very broad range of scenarios generally associated with heating, ventilating, and air conditioning equipment. As to what the scenarios are, I would prefer not to guess.

Q. Okay. In the 415 fires that were identified as resulting from heating and ventilation equipment, how many of them produced a property over a thousand degrees C?

MR. CAMPBELL: Object to the form of the question.

A. Those temperatures are not pretty unusual in the context of fires. It's not something that I've attempted to determine.

Q. I'm not talking about the fire itself because we all know that. I'm talking about the actual heating and ventilation equipment that you've identified as being installed in warehouses and has accounted for 415 fires. We could take "accounted" and turn that to "cause." So 415 fires caused by heating and ventilation equipment in warehouses. I would like to know, of those, how many of those resulted in any parts of the heating and ventilation equipment being shattered, raining, projecting, at over a thousand degrees C?

MR. CAMPBELL: Object to the form of the question. Go ahead.

A. So one of the most common causes of fires in any occupancy is electrical, electrical causes, and electricity always presents that risk. Electrical fires that are started by either high resistance shorts or direct

metal-to-metal arcing do and can result in temperatures that are just as high, if not higher than this that would cause copper to melt and so forth. In fact, I've seen certain situations, you can see glass melting, which is not the case in the context of non-passive failures of HID lamps. So electrical causation of fires routinely will cause arcing, very loud noises, certainly localized short duration pressure buildups that creat sound, as well as elevated temperatures, and if that particular event is restricted and confined to a very small area that doesn't significantly spread, there can be minimal consequences associated with that, and I think all of us have probably experienced that at one time or another when we've stuck a fork into the outlet, as my daughter did when she was four, and made a very loud noise. So the elevated temperatures that are sustained for a short period of time aren't necessarily in any way indicative of significant damage.

Q. That's all great, but you know, as I do,

that didn't have anything to do with my question, to be honest with you. Frankly, you know --

A. I thought --

MR. CAMPBELL: Put your question, please.

Q. Obviously, I wasn't clear, so I'll try to rephrase it for you, because I didn't write this paragraph 56. You did. In this paragraph 56, you say "Heating and ventilation equipment installed in warehouses accounted for 415 fires," and I want to know, of those 415 fires, how many of them had heating and ventilation equipment spraying, raining, shattering, at over one thousand degrees C?

A. I mean, I can't answer that question. I think that the characterization that you provide is not something that I can get my arms around, nor something that engineers in the process of doing this kind of investigation would actually be able to quantify in some useful manner.

Q. Okay. So you don't have the answer to that, to the question that I asked?

A. Well, I was quantitative, actually, in answering the previous question, which I thought was the same question, and I don't know about raining and whatever else it is that you characterize.
Q. Do you remember earlier today you used the word "rain" to describe what happened to the hot quartz particles after an NPF?
A. Yes. What I talked about is dropping down. I may have said "raining down," yes.
Q. That's why I used the word. I'm using the analogy now. You used "rain" for your hot quartz particles after an NPF. I want to now take your "rain" to heating and ventilation equipment installed in warehouses accounting for 415 fires --
A. Uh-huh.
Q. -- and what you're telling me is you just don't know whether in any of those, all of them or none of them, that actually happened --
MR. CAMPBELL: Objection.
Q. -- that any heating and ventilation equipment resulted in the raining of one thousand degree C heating and ventilation

equipment.

MR. CAMPBELL: I object to the form of the question. Go ahead.

A. So what I do know is that, in the event of the specific examples that I have already provided, is if you have, say, an arc between one energized conductor and another one that is not, you're going to have very high localized currents, very high temperatures, and molten metal can drop down and rain down and that happens in electrical faults.

Q. Respectfully, though, you don't know if that's the cause involved in any of these 415 fires. That may all be true about arcing and combustion and fires, but you don't know if any of these were electrically-related; right?

MR. CAMPBELL: Object to the form of the question.

A. The purpose behind the endeavor -- so the effort that I undertook with NFIRS -- was to quantify the frequency of heating and ventilation equipment associated with fires.

Q. In warehouses?

A. In warehouses, and to contrast it with various other things, including lightening. That was the purpose. Now, you're asking me a question about information that really didn't fall under what I was trying to undertake. Now, so I think almost by definition, I don't know what the question is because I wasn't trying to answer that question.

Q. Okay. In paragraph 57, you talk about the GE 750 watt lamp "is not a consumer product and is used in commercial and industrial locations." What do you mean by, "it is not a consumer product"?

A. What I mean by that is that private citizens would not tend to use those. Those are products that are used in industrial settings by professional people, whether they are responsible for the facilities, such as David Kuzmick, was a good example, in facilities such as warehouses, parking lots, manufacturing facilities and so forth. That's where you tend to see these lights and I think that that is the vast majority of who the clients are who purchase

these. These are not purchased by people like you and me.

Q. In your tab number 2, those first two pages that we were looking at before, do those two pages come with the lamp itself?

A. I don't believe these two pages come with the lamp. I think these pages were provided to David Kuzmick and Metso for the purpose of making a determination as to what they should be buying.

Q. So at some point, Metso acquired a volume, a quantity of 750 watt lamps?

A. Yes.

Q. Did these two pages or anything like these two pages come with those purchased 750 watt lamps?

A. I don't believe -- I mean, these two pages, Metso already had. I think that the lamps would have come in boxes with wrappers, and that's my understanding.

Q. And in looking at tab number 8, did this document come with the actual lamps?

A. I wouldn't expect this catalog, this lamp product catalog, to necessarily come with the lamps. This is a tool that you use for

purposes of selecting a product for purposes of purchasing the product and contains much the same information that was provided to Dave Kuzmick in the two pages behind tab number 2. This tab number 2 document has technical information associated with the 750 watt product.

Q. What industry is Metso Paper, Clarks Summit facility, in?

A. They're in the -- so broadly in the paper industry, but they're in the business of, as I understand it, equipment refurbishment --

Q. What type of equipment?

A. For the paper industry. Coaters and paper machines.

Q. Are they in the insurance industry?

A. No, no. Well, my understanding is -- and obviously, Metso is a large concern, so that particular facility is in the business of coaters and performing maintenance and repair on coaters, that the concern itself does a broad range of things.

Q. Are you aware that they're in the insurance industry?

MR. CAMPBELL: Metso Paper?

MR. STERN: Yes.

A. You're asking me whether they're in the insurance industry?

Q. Yes.

A. I don't know. They may be. If you look at GE, for example, they're also in financial services. So they are a very large concern. I don't know the entire breath of their activities. So they may be in the insurance business, for all I know.

Q. You don't know?

A. I don't know.

Q. Is Metso a member of NEMA?

A. I wouldn't be surprised if they were. NEMA is really in the business of electrical -- it's an organization that has to do with electrical products and Metso is a large concern and may have certain branches that are associated with NEMA.

Q. In 2002, was Metso a member of NEMA?

A. I don't know. I haven't attempted to determine that.

Q. Prior to the January, 2006 explosion, did Metso have possession of any of the documentation within exhibits 10 or 11?

A. That's a very broad question. I mean, the population of employees in Metso is very large. I would not be surprised if certainly, there would have been many members of NFPA within Metso that may have obtained information of the kind that we have here, people responsible for insurance matters, that would be connected with FM Global, IRI, or other insurance companies that, let's say, are in the business of recognizing, controlling and mitigating risk, may have been aware of some of these materials. I can't tell you, one way or the other, but just the sheer size of that organization is such that it's entirely possible.

Q. I don't want your speculation. I went specifics. My specific question is: Prior to the fire in January of '06, did Metso have in its possession what you have in your exhibit 10 and in your tab exhibit 11?

A. That's a broader question than I can answer. I have not attempted to determine whether Metso has had these materials in their possession. I can't answer that

question. I can't answer as to whether anybody had any of the materials behind my tab 10 at Metso. I haven't undertaken that exercise of trying to make such a huge determination,.

Q. Can a 750 metal watt manufactured by GE explode prior to its rated life?

A. Non-passive failure really have to do with the aging process that lamps undergo, so it's impossible or highly improbable for that to happen.

Q. Can it happen?

A. I think, in a sort of theoretical statistical sense, there is a remote possibility, but practically speaking, you don't expect it to happen.

Q. In the last paragraph of your report, in the middle of the paragraph, you state, "It was also clear by 2002 that open Halide Metal fixtures should not be placed over combustible material and that either protected lamps (shrouded) or lens covers should be used in such applications." Do you see that sentence?

A. Yes.